chine had sufficient power to fly, sufficient strength to withstand the shock of landing, sufficient capacity to control. Winter had already set in when the last trials were made, but these facts were definitely established, and we know that the age of the flying machine has come at last.—Wilbur Wright in *The Independent.*

NOTES ON INORGANIC CHEMISTRY.

Two papers have recently appeared in this country which, while not directly concerned with inorganic chemistry, have an important bearing on it. The first of these is a 'New Method for Determining Compressibility,' by Theodore William Richards and Wilfred Newsome Stull, and is published by the Carnegie Institution. Very little work has been previously done on the compressibility of inorganic substances, although such investigations are calculated to throw light upon the subjects of chemical affinity and cohesion. New methods have been devised by which the compressibility of nearly all solids and liquids can be determined up to 600 atmospheres or more. By means of these methods Richards and Stull have determined the compressibility at 20° of iodin, bromin, carbon tetrachlorid, chloroform, bromoform, water, phosphorus and mercury, while that of chlorin was estimated by extrapolation. Bromin is much more compressible than iodin, and it is probable that chlorin is still more compressible, being rather more than twice as compressible as water. Phosphorus is hardly half as compressible as water, while mercury was the least compressible substance measured, having a value less than ten per cent. that of water. In every case the compressibility decreases with increasing pressure. The authors suggest the use of the term *megabar* to indicate the pressure of a megadyne on a square centimeter, giving an absolute standard instead of the unscientific unit of an atmosphere. The value of a megabar is 75.015 centimeters of mercury or 98.703 per cent. of an 'atmosphere.' This the authors point out is more nearly the average pressure at the laboratories of the world than the arbitrary 'atmosphere' usually taken.

The second paper is on 'The Electrical Conductivity of Aqueous Solutions at High Temperatures,' by Arthur A. Noyes and William D. Coolidge. This is the first contribution from the recently established research laboratory of physical chemistry of the Massachusetts Institute of Technology, and concerns the description of the apparatus used and the results with sodium and potassium chlorid up to 306°. Great difficulty was encountered in devising a suitable conductivity cell which should fulfil the other necessary conditions and be capable of withstanding the great pressures at high temperatures. The cell finally found satisfactory was a platinum-lined soft crucible steel cell, with gold wire packing and quartz insulation. In the experiments with sodium and potassium chlorids it was found that the degree of dissociation decreases with the temperature. With tenth-normal solution of sodium chlorid this decrease is very rapid, from about 83 per cent. at 18°, to 60 per cent. at 306°, and indicates that the degree of dissociation is very small at the neighborhood of the critical temperature (about 360°). The conductivity of the vapor over a tenth-normal solution of potassium chlorid at 306° was too small to be observed with the apparatus, and is at all events exceedingly small. The investigations with this cell are being continued and it is hoped to extend the observations up to the critical temperature.

To the 'Quarterly Statement of the Palestine Exploration Fund' a paper is contributed by William Ackroyd on a principal cause of the saltness of the Dead Sea. After showing the insufficiency of the soil and rocks to furnish more than a fraction of the salt present, and that the theory that its saltness is due to its being a former arm of the Red Sea, which has gradually become concentrated, is not substantiated by facts, he claims that the most important cause is the atmospheric transportation of salt from the Mediterranean. As in other localities, the rain water would be charged with salt to a degree which varies in a direct manner with the velocity of the winds coming from the sea. This view is confirmed by the fact that the ratio of chlorin to bromin is approximately the same as that for these two elements in the Mediterranean.

IT has been generally accepted that Moissan prepared diamonds synthetically by chilling an iron rich in carbon, the supposition being that in the interior of the mass of iron, solidified on the exterior, the pressure on solidification must be intense, and that under these conditions the carbon crystallized in the form of the diamond. This position is very strongly attacked by C. Combes in the *Moniteur Scientifique*. In his paper he argues that Goeppert and Friedel have found plant remains in diamonds, showing that the crystals must have been formed at a temperature below at least 772°. At the temperature of fused cast iron the diamond is converted into graphite. The diamonds supposed to have been formed by Moissan were doubly refracting, and hence not diamonds. Moissan's analyses of his crystals were unsatisfactory for diamonds. Finally Friedel has proved that such a mass of iron as was used by Moissan really contracts on cooling instead of expanding, and hence the supposed pressure was not present. Thus it appears to Combes impossible that Moissan has prepared diamonds synthetically. It is, however, possible that Hannay was more successful in this respect. J. L. H.

RECENT ZOOPALEONTOLOGY.

THE SAUROPODA.

Two memoirs have recently appeared on this group which greatly extend our knowledge, from the Carnegie and the Field Columbian Museums.

'Osteology of Haplocanthosaurus.'* This memoir by Mr. J. B. Hatcher is devoted to a new sauropod which is decidedly more primitive than any of the American Sauropoda hitherto discovered. In an exhaustive memoir illustrated with six plates the author describes it in detail. The principal new points are the following: The spines of all the cervical and dorsal vertebræ are single or simple, as in the carnivorous dinosaurs, instead of double, as in *Diplodocus, Morosaurus* and *Brontosaurus*. There are apparently fourteen dorsal vertebræ instead of ten as in the above-named forms, and from thirteen to fifteen cervicals; five sacrals and about forty caudals. The locality is the classic one of Cañon City, from which Marsh secured his type of *Diplodocus* about 150 feet above the summit of the red Triassic sandstones; the author believes it to be a lower horizon, of greater age than the Como Bluffs. As regards proportions, the thoracic region is believed to be proportionately longer than in the other dinosaurs. The limbs are elevated, and *Haplocanthosaurus* appears to have been an essentially quadrupedal type.

As regards general questions, the author considers the Dinosauria as a subclass. He adheres to the use of the term Sauropoda in preference to Opisthocœlia Owen or Cetiosauria Seeley. In this connection it may be pointed out that while Owen defined the Opisthocœlia as the suborder Crocodilia in 1859, he recognized them as Dinosauria in 1875. *Haplocanthosaurus* is placed in the family Morosauridæ, which is considered the most primitive family of Sauropoda. An especially interesting point is its resemblance to a type recently described from South America.

A very valuable feature of the memoir is the discussion of the age of the *Atlantosaurus* beds and of the geological section at Cañon City. The author shows that Cope's *Camarasaurus* skeleton was probably found 350 feet higher than *Haplocanthosaurus*. The conclusion is that the beds are chiefly of Upper Jurassic age, but in their uppermost members they may represent a portion at least of the Cretaceous.

'Structure and Relationships of Opisthocœlian Dinosaurs.'* The skeleton on which

* 'Osteology of Haplocanthosaurus with Description of a New Species, and Remarks on the Probable Habits of the Sauropoda and the Age and Origin of the Atlantosaurus Beds,' by J. B. Hatcher, *Memoirs Carnegie Museum*, Volume II., No. 1, November, 1903. There are a few points requiring revision: The sacral ribs are described as 'parapophyses,' which a reference to the Permian ancestors of the dinosaurs will probably show to be incorrect. The theory that the Sauropoda were aquatic reptiles is through a misunderstanding attributed to Osborn.

* 'Structure and Relationships of Opisthocœlian Dinosaurs, Part I., Apatosaurus Marsh,' by Elmer S. Riggs, A.M., Publ. Field Columbian Museum 82, Geol. Ser., Vol. II., No. 4, August, 1903.